Chapter 18 Worksheet 1

Electrostatic Problems

1. Mrs. Anthrax rubs two latex balloons against her hair, causing the balloons to become charged negatively with 2.0×10^{-6} C. She holds them a distance of 0.70 m apart. A) What is the electric force between the two balloons? B)Is it attractive or repulsive .073 N

2. Two pieces of puffed rice become equally charged as they are poured out of the box and into Mr. Blaschko's cereal bowl. If the force between the puffed rice pieces is 4×10^{-23} N when the pieces are 0.03 m apart, what is the charge on each of the pieces? 2×10^{-18} C

3. A raindrop acquires a negative charge of 3.0×10^{-18} C as it falls. What is the force of attraction when the raindrop is 6.0 cm from the bulb on the end of a car antenna that holds a charge of 2.0×10^{-6} C? 1.5×10^{-11} C

4. Pica the cat is batting at two ping-pong balls hanging from insulating threads with their sides just barely touching. Each ball acquires a positive charge of 3.5×10^{-9} C from Pica's fur and they swing apart. A) If a force of 6.0×10^{-5} N acts on one of the balls, how far apart are they from each other? B) Is the force between them one of attraction or repulsion? .043 m

5. Mr. Werewolf Syndrome, an auto body painter, applies paint to automobiles by electrically charging the car's outer surface and oppositely charging the paint particles that he sprays onto the car. This causes the paint to adhere tightly to the car's surface. If two paint particles of equal charge experience a force of 4.0×10^{-8} N between them at a separation of 0.020 cm, what is the charge on each? 4.2×10^{-13} C

6. A mosquito accumulates 2.5×10^{-10} C of charge as it flies through the air. What is the magnitude and direction of the electric field at a distance of 1.5 cm from the mosquito? 1.0×10^{4} N/C or V/m

7. A copy machine produces an electric field of 2.2×10^{6} N/C on a particle of toner carrying a charge of 4.5×10^{-9} C. What is the force acting on the toner particle to push it toward the paper? 9.9×10^{-3} N

8. A computer screen works by steering an electron beam across the screen using an electric field. If an electron experiences a force of 3.25×10^{-6} N, how large is the electric field? 2.03×10^{13} N/C or V/m

9. A lightning bolt hits a cyclist with a tongue ring after traveling 120 m to the ground through an electric field of 1.5×10^{6} V/m. What is the potential difference? 1.8×10^{8} V

10. Mr. Crump recharges his dead 12.0 V car battery by sending 27500 C of charge through the terminals. How much electric potential energy must Crump store in the battery to charge it? 3.30×10^{5} J

11. Ms. Harper builds up a charge on her body from the Van de Graaf generator. As she reaches out her hand to touch a nearby student, she discharges 125000 V through an electric field of 2.25×10^{6} V/m. How far is her hand from the student when the spark discharges? 5.56×10^{-2} m